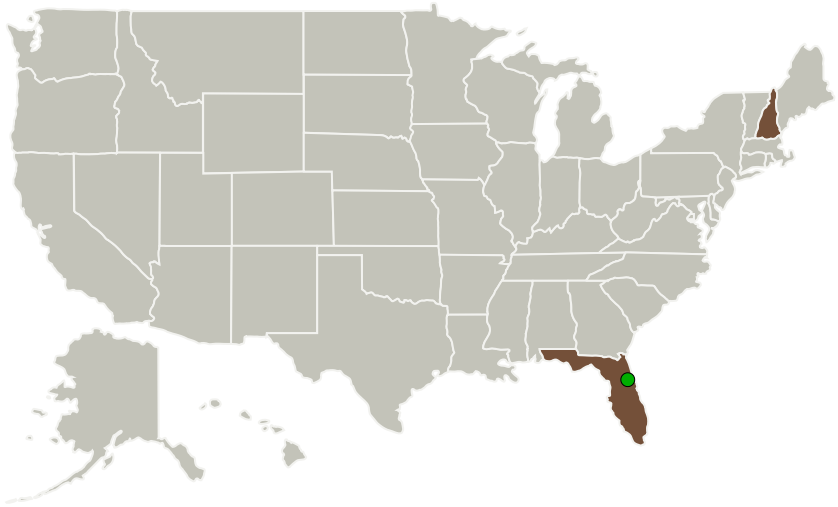
Miniature Gas Chromatograph Mass Spectrometer for In-Situ Resource Utilization, Phase I

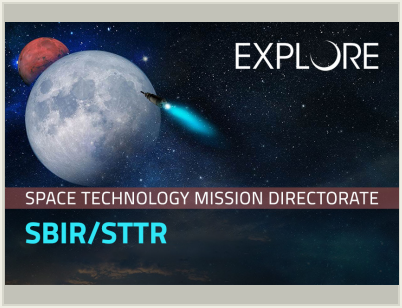
Completed Technology Project (2012 - 2012)

Project Introduction

In situ resource utilization (ISRU) is essential for several of NASA's future flagship missions. Currently envisioned ISRU plants include production of oxygen from hydrogen reduction of lunar regolith and extraction of water from Martian regolith or asteroid material. These ISRU processes require heating of the regolith to high reaction temperatures. To support ISRU activities, NASA requires the development of a compact, lightweight gas chromatograph – mass spectrometer (GC-MS) instrument that can quantify volatile gases released by sample heating below atomic number 70. The instrument must also be designed to withstand exposure to the release of HF, HCl, or Hg that may result from heating regolith samples to high temperatures. Creare proposes to design, build, and test a compact, lightweight gas chromatograph - mass spectrometer (GC-MS) system, capable of detecting, identifying, and quantifying ppm to 100%-level concentrations of relevant compounds having mass less than 100 amu. Our GC-MS design is based on components that have been previously or can easily be space-qualified using techniques proven on numerous past space hardware development projects. During the Phase I project, we will prove our design with benchtop testing, and in Phase II, we plan to build engineering model versions of our GC-MS.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations	
Florida	New Hampshire

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140298)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul H Sorensen

Co-Investigator:

Paul Sorensen

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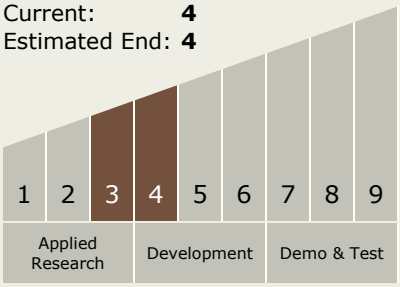
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.1 Destination Reconnaissance and Resource Assessment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System